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ABSTRACT

New England's economic competitiveness in a global economy and the role of the area's colleges and universities in contributing to that competitiveness are discussed, including a review of a similar analysis from the perspective of the state of Connecticut. The report examines information developed from a study having three research components: (1) the internationalization of the New England economy; (2) the attitudes of corporate, government, and university leaders on higher education's role in preparing for a global economy; and (3) a 40-campus study of what is and is not happening in this preparation. Recommendations at the regional level and for higher education institutions are presented. In addition, Connecticut's economy and the state's higher education institutions are examined in the context of being able to meet international competitiveness. Among the topics covered are: Connecticut's trading position and international awareness; business-university cooperation and coordination in developing competitiveness; research and development investments; funding availability; technology transfer and technical assistance; and educational needs. Recommendations are presented to enhance the Connecticut higher education community's response to the challenge of global competitiveness. The appendix includes a trade profile for Connecticut. (GLR)

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NEW ENGLAND BOARD OF HIGHER EDUCATION

ECONOMIC COMPETITIVENESS AND INTERNATIONAL KNOWLEDGE

Special Policy Briefing
For
Connecticut Legislators

February 1989

A Regional Project on the Global Economy
and Higher Education in New England

HE 024 077

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A Special Policy Briefing
for
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February 1989

Prepared
by
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PREFACE

The Regional Project on the Global Economy
and Higher Education in New England

by

John C. Hoy, President
New England Board of Higher Education

Connecticut's future economic growth is tied directly to its ability to compete in international markets. The state's international competitiveness, in turn, rests on the effectiveness of higher education. Broadly speaking, colleges and universities across Connnecticut and throughout New England play two crucial roles in enhancing competitiveness. They offer the promise of a competent and internationally aware citizenry. And their research stimulates the entrepreneurial activity and innovative spirit that make the state and the region forces in world markets.

The New England Board of Higher Education has initiated a study of specific roles the region's institutions of higher education can be expected to play in the international economy--what the campuses are doing now, what they may consider doing in the future to enhance competitiveness and international understanding.

The NEBHE study has three research components: an analysis of the internationalization of the New England economy; a region-wide assessment

titled: The Future of New England Survey, which reviewed attitudes of corporate, government and university leaders on what higher education should do to prepare the region for the global economy; and a 40-campus study of international activity on our campuses.

Through several background papers, a region-wide survey of corporate, education and government leaders, and publication of reports in Connection, New England's Journal of Higher Education and Economic Development, over the last two years, the NEBHE staff have analyzed new ways for the region's higher-education community to join in partnership with New England businesses and governments to meet the global economic challenge.

NEBHE has also published the following preliminary studies on the international competitiveness issue: Economic Competitiveness and International Knowledge and The Impact of Economic Globalization on Higher Education.

Corporate executives, economists and leaders in higher education have generously advised the Board and contributed to the preparation of the following perspectives and recommendations.

PERSPECTIVES

* The massive U.S. trade deficit is an urgent problem for New England and the nation. Closing the trade gap requires an interrelated set of long-term strategies involving business, government and education.

* New England has become a significant partner in the knowledge-based global economy. The export of innovative technological products and advanced professional services are among its greatest growth fields. The more the economy moves into high tech and sophisticated services, the more

international it becomes. We face a fundamental change in our economic system as industries from finance to advanced manufacturing compete in global markets. New England's comparative advantage in these knowledge-intensive industries depends on a well-educated, high-skilled work force.

* In the global economy, we are competing not only with other economic systems, but with our competitors' research and educational systems. Economic competitiveness requires educational effectiveness: our work force must have basic math and computer skills, as well as scientific, technological and international knowledge at least equal to that of our major world competitors. Public understanding of the new global economy is crucial because international competitiveness will become central to state and federal policies affecting the domestic economy. Indeed, the global economy already touches our lives directly: 80 percent of all U.S. goods now face international competition either at home or abroad.

* Colleges and universities are the primary generators of new scientific and technical knowledge which is critical for economic competitiveness. They are the chief sources of international understanding of other peoples and cultures, and the major sources of new competencies increasingly required in most fields. In fact, higher education also is one of the strongest competitive features of the economies of New England and the nation. It is a major export sector providing services to an international clientele. And its research has spawned scores of New England companies and even whole industries on the cutting edge of technological innovation.

The central issue: how will higher education, government and business meet the new challenges before them?

RECOMMENDATIONS AT THE REGIONAL LEVEL

1. Collect the facts. Throughout the planning stages of the NEBHE project, it has become clear that up-to-date information on state-by-state trade--export-import data--as well as factual information on direct foreign investment is woefully inadequate. The most recent available trade data is for 1984. Four very significant years have passed during which international economic activity is estimated to have expanded at historic rates. We anticipate that in January 1989, the U.S. Department of Commerce will be in a position to release 1985-86 information which will be useful in updating state and regional analyses. Still, there is virtually no data on one of New England's most significant economic sectors: professional services such as scientific research, law, medicine, management consulting and higher education.

Each New England state should implement and support a collaborative program to annually gather the facts concerning economic activity. In addition, a regional analysis of state and federal data should become a part of New England's global outreach program. With cooperation among NEBHE and regional business organizations, a clearinghouse should be created to develop and disseminate New England international economic data. The data should be disseminated to the region's governors, state legislators and leading executives, as well as colleges and universities.

2. Broaden the discussion. High-visibility regional conferences and greater communication with the media should be used to develop understanding of our region's place in the global economy. Conferences should include well-known business, higher education and government leaders. The conferences should address the importance of international trade and investment to New England, our region's competitiveness problems and their consequences, and

ways to develop collaborative action among business, education and government to advance New England's competitiveness.

3. Seek to focus federal legislation. Our New England congressional delegation should consider ways to make the Higher Education Act (HEA) and other federal legislation key instruments of adaptation to the new global economy. The Congress, through the recent Omnibus Trade and Competitiveness Act, has taken the first steps by amending the HEA to authorize support for international business centers and technology transfer centers. The HEA's basic emphasis on access and opportunity is still needed: if America is to be competitive, it will require the contributions of all Americans. It is becoming imperative, however, to move beyond access toward outcomes which will advance competitiveness.

RECOMMENDATIONS FOR HIGHER-EDUCATION INSTITUTIONS

1. Initiate institutional planning. International competition elevates the importance of international education. We recommend that campuses undertake strategic planning aimed at evaluating their strengths, weaknesses and potential with regard to the global economy. This planning should apply to all aspects of academic institutions' operations, including curriculum, faculty and library development, exchange programs, institutional linkages, external relations and administration.

2. Build business-academic partnerships. Academic institutions are positive forces in attracting foreign investment to our communities. But the academic community is an underutilized resource for New England's international economic development. As a first step toward building

partnerships beneficial to our campuses and region, we recommend that colleges and universities systematically address the strengths they can offer to the business community and to agencies such as regional development authorities.

3. Provide analysis. New England academic institutions are providing negligible data, analysis or perspective on the internationalization of the New England economy. The region has no academic institute focusing on New England international trade, investment or services, no institute focusing on the global economy more broadly, and no significant academic network of people working on these issues. There have been superb recent academic studies of the global business system, provocative analyses of competitiveness problems, and increased academic attention to business relations with Canada. But our region lacks a strong institutionalized focus on its place in the global economy. Corporate and political leaders have no place to turn for an overview, and no place providing regionally focused material for teacher and citizen education. It is important for New England to have accurate and comprehensive data and first-rate analysis. We recommend that our higher-education institutions address this problem.

4. Focus on the global economy in the liberal arts. We asked corporate, government and higher-education leaders to indicate the most important ways that colleges and universities can prepare our work force for a global economy. The respondents considered it most important to "design an undergraduate curriculum that ensures understanding of a global economy," even ranking this challenge ahead of the need to "expand the supply of scientifically and technically educated men and women." The liberal arts can familiarize undergraduate students with the concerns that will affect their lives and careers. The globalization of the economy and U.S. international

competitiveness will clearly influence the lives of our graduates whether or not they become employed by companies involved in international trade. Yet no institution offers an introductory course on the global economy. We recommend that institutions include such a course in their basic curricula and make materials available for in-service teacher education programs.

5. Develop faculty competencies in both business schools and the liberal arts. There is a shortage of qualified people with international backgrounds to serve on business school faculties. At the same time, there is a pervasive need for current faculty members to be able to integrate international knowledge into business school curricula. Among faculty members in the liberal arts, there is a parallel inadequacy to provide a global economic and business perspective. Moreover, our faculties have little understanding of the international dimensions of the New England economy. We recommend the creation of a faculty development program designed to produce multiplier effects on the campuses and to build strong bridges between business and liberal arts faculties.

6. Connect business studies with foreign language and world area studies. We find a growing need to link foreign language study and international courses with business programs. The need is particularly great with regard to Asia, where our negative trade balance coincides with weak academic preparation concerning the region and its culture. Businesses increasingly need people who combine area knowledge with business knowledge. We also find it increasingly important for those whose pursuit is area studies to understand the growing importance of economics in international relationships and the essential features of the global business system. We recommend that our higher-education institutions emphasize these relationships.

7. Arrange internships in international business. New England students have few opportunities to benefit from experience in companies outside the United States or in internationally focused companies within New England. At the same time, the growth of foreign alumni contacts and the international aspects of New England-based companies, as well as the establishment of 1,500 foreign subsidiaries in New England, provide prospects for increasing the number of internationally focused internships. Internships contribute to student competence, cross-cultural understanding and career direction and momentum. Their availability alone signals the importance of international business and induces especially able students to include international aspects of business in their career planning. Lasting programs rather than ad hoc arrangements are needed to provide organizational bases for the expansion of opportunities. We recommend corporate-academic collaboration to create internship programs and suggest establishment of selection processes parallel to those used in awarding prestigious fellowships.

8. Provide continuing education and outreach to the business community. Corporate personnel and business faculty have indicated a widespread and increasing need for outreach programs to advance the understanding and competencies needed in the global economy. One clear constituency is the high-tech community and its engineer-managers whose interest is in policy frameworks, international corporate coalitions, technology transfer and managing and negotiating across cultures. With notable exceptions, New England colleges and universities have not yet offered appropriate courses and seminars in convenient locations or at convenient times for business personnel, nor have they been utilizing new interactive and other learning technologies to reach these audiences. We recommend collaboration between business and higher education in conceptualization, market analysis and

delivery of internationally relevant programs. We also recommend attention to the possibility of designing degree programs that combine engineering and technical study with a program of international management.

PROJECT OUTLOOK

As the Regional Project on the Global Economy and Higher Education in New England proceeds, the NEBHE staff are confident that state house briefings for elected officials will be well-received throughout the region.

The project is a long-term effort on the part of NEBHE to assure consistent attention to the results of effective state initiatives throughout the region.

I. THE GLOBAL ECONOMIC CHALLENGE

The loss of international economic competitiveness experienced in the United States over the past two decades has been well-documented. The facts reveal a decline in productivity growth, periodic national and regional recessions; growth of federal budget deficits as well as international trade deficits; the decline in the U.S. share of worldwide gross national product; U.S. decline in nondefense research and development (R&D) expenditures as a percent of U.S. GNP; the lagging performance of U.S. students behind those of other countries both on comparative achievement tests and decline in high school completion; the fall in the numbers of U.S. students pursuing doctorates in science and technical fields...the list of factors goes on.

New England has fared far better than the nation as a whole over the past decade and continues to be cited both nationally and internationally as the prime example of the nation's capacity to reindustrialize. The region has experienced advanced industrial development based upon pre-eminent scientific infrastructure and technological innovation. New England's unequaled higher-education infrastructure has been credited for its primary impact on the region's economic renewal.

Nonetheless, New England is now at a major crossroads. With an economy that is no longer in the vibrant phases of growth, how can the region sustain its recent success? More importantly, how can we meet the complex challenges of intense international economic competition?

The economies that will meet this challenge are those capable of fostering a resourceful and flexible workforce that can utilize swiftly changing advanced technologies in an efficient and effective manner. Indeed, a well-educated workforce has been New England's primary advantage, and will become even more so as the economy becomes more international.

It has become clear that state inititatives in behalf of international competitiveness are required. This is a new role for the states. The territory is not well charted.

The NEBHE Regional Project

The New England Board of Higher Education's Regional Project on the Global Economy and Higher Education was established in early 1987.

The project is based on the following underlying premises:

- Competition on a global basis is a far more complex and demanding challenge than competition at home;
- As New England's economy becomes increasingly knowledge-intensive and dependent upon emerging advanced technologies and sophisticated services, the region also becomes more dependent upon skilled human capital development. This is one reason that institutions of higher education will become key players in regional initiatives to meet global economic imperatives;
- The world economy, not the domestic economy, will grow significantly over the next several decades. New England's state and regional economies must be nurtured so they are well-positioned to take advantage of available worldwide markets;
- To be competitive in the global marketplace, policymakers must understand the strengths of each state's economy in an international context, as well as in an interstate and national context.

What follows is a summary of the issues as they pertain generally to the region and more specifically to the state of Connecticut.

II. CONNECTICUT'S ECONOMY IN AN INTERNATIONAL CONTEXT

Foreign Investment in Connecticut

In the last year, the level of foreign investment in the United States has sparked concern. But studies by regional and national economists suggest that to date the impact is relatively small both in New England and in the nation. What foreign investment has occured has been beneficial to New England in the long term in that it has introduced diversity to local economies. As global trade increases, foreign investment in the United States and by U.S. companies in other nations is very likely to continue increasing.

Employment by foreign-owned companies represents 4 percent of total employment in Connecticut, slightly above the New England average of 3.7 percent. Nationally in 1985, Connecticut ranked 13th in employment by foreign affiliates per 1,000 population, and 20th in the number of foreign affiliates with property, plant and equipment in the state. However, the gross book value of property owned by foreign affiliates, as well as the acreage of foreign-owned land, were negligible in 1985. In these two capacities, Connecticut ranked 48th and 50th, respectively (See Table 1).

TABLE 1

Foreign Employment in New England: 1986

(numbers in thousands)

	Non-farm Employment* (1)	Employment in Foreign Companies+ (2)	Percent in Foreign-Owned Companies**
CT	1,267.0	50.7	4.0%
ME	367.0	21.7	5.9%
MA	2,390.0	76.7	3.2%
NH	399.0	16.7	4.2%
RI	359.0	11.2	3.1%
VT	185.0	7.0	3.8%
NE	4,965.0	184.1	3.7

*The government and financial sectors were removed from total non-farm employment for compatability purposes with non-bank company affiliates data.

+U.S. Department of Commerce data for non-bank foreign company affiliates

**Figures in Column (2) as percent of those in Column (1)

Note: Figures may not add up to totals due to rounding

Source: Wentrup, Hans J., "Foreign Ownership Has Only Mild Impact," New England Business, December 1988; and U.S. Department of Commerce, Statistical Abstract of the United States, 1988.

Manufactured Exports: Their Impact

The United States experienced flat growth in exports from 1981 through 1986, while imports grew at approximately 7.5 percent per year. The nation saw modest improvement in exports, beginning in early 1987. By mid-1987, American exports were surging and continued to do so throughout 1988. Although continued strength in imports has prevented significant improvement to the trade balance, the U.S. trade deficit by September 1988, shrank to its lowest level in three years.

The current export boom has been attributed, in part, to a weakened U.S. dollar, yet many economists note other important factors, such as:

- Continued vitality in service exports (the trade balance for the service sector was in the black even when overall deficits were at record highs, but projections for 1988 suggest the service sector has lost strength);

- A new emphasis by the nation's exporters on making quality products and developing leading-edge technology;

- The return home of some manufacturing that had been shifted to nations with lower labor costs;

- The relative strength of foreign economies, particularly Japan's and Europe's, that are able to absorb U.S. exports both now and in the forseeable future.

Still, exporting has not come naturally to U.S. companies. In 1987, exports represented only 5.4 percent of U.S. GNP, compared with 26 percent of

West Germany's GNP, 25 percent of Canada's, and 10.5 percent of Japan's.

The United States has long been considered the world's richest market. As a result, U.S. businesses have established a narrow frame of reference that generally ends at the Atlantic and Pacific oceans. Now U.S. businesses are relatively ignorant of foreign cultures, languages and markets. The global economy demands that we heighten our international awareness.

Dollar Value of Manufactured Exports

New England's manufactured exports totaled $20.9 billion in 1986, 15.5 percent more than in 1984. The region's largest exporting industries included non-electrical machinery, electronics, transportation equipment, scientific instruments, and fabricated metals. These five industries accounted for approximately 71 percent of the value of the region's manufactured exports.

Exports of non-electrical machinery, the region's largest industry, totaled $5.5 billion in 1986, almost 20 percent above the 1984 level. Twelve percent of the dollar value of the nation's total exports by this industry were made in New England.

The region's exports of electronic equipment were valued at $4.1 billion, approximately 32 percent above the 1984 level. This industry accounted for 9.6 percent of the electronics industry's total dollar exports nationwide. Scientific instruments exported from New England ranked fourth in total dollar value. However, New England's export of scientific instruments represents almost 15 percent of the value of all scientific instruments exported from the United States.

Connecticut's five leading exports in dollar value were: transportation equipment, non-electrical machinery, electronics, fabricated metals and scientific instruments. The value of Connecticut's high tech exports increased substantially from 1984 to 1986. The non-electrical machinery, electronics and scientific instruments industries all posted major increases in exports (See Table 2).

TABLE 2

Value of Top Ten Manufacturing Industries in Connecticut:

1984 and 1986

(in millions of dollars)

INDUSTRY	1986 VALUE	1984 VALUE
TRANSPORTATION EQUIPMENT	$1,925.2	$1,895.9
NON-ELECTRICAL MACHINERY	1,244.6	916.4
ELECTRIC AND ELECTRONIC EQUIPMENT	789.5	695.1
FABRICATED METAL PRODUCTS	478.5	405.3
SCIENTIFIC INSTRUMENTS & RELATED PRODUCTS	464.4	360.8
PRIMARY METAL INDUSTRIES	383.8	416.8
CHEMICAL AND ALLIED PRODUCTS	353.2	271.9
RUBBER AND MISC. PLASTIC PRODUCTS	130.3	125.2
PAPER AND ALLIED PRODUCTS	111.8	90.3
PRINTING AND PUBLISHING	96.1	79.0

*Industries are listed in highest to lowest in order of the 1986 dollar value.

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1984 through 1986, Table 5a.

In real dollars, transportation equipment is Connecticut's largest export industry. But this industry ranked 4th in terms of what share of total production was exported. In fact, transportation equipment and stone, clay and glass were the only Connecticut manufacturing industries in which exports as a percent of total industry value declined (see Table 3). By this latter measure, non-electrical machinery, primary metals and electronics rank first through third. More than 24 percent of the value of non-electrical machinery, more than 23 percent of the value of primary metals and more than 22 percent of the value of the electronics industries were exports. Electronics exports increased by almost 7 percent of the total industry value.

TABLE 3

The Value of Manufactured Exports

as a Percent of Total Shipments by Industry:

Connecticut & the U.S.: 1984 and 1986

	1986		1984	
Industry+	Connecticut	United States	Connecticut	United States
Non-Electrical Machinery	24.1	22.8	20.3	21.5
Primary Metals	23.3	23.3	19.9	19.5
Electronics	22.4	21.3	15.9	18.2
Transportation Equipment	22.4	13.6	23.4	12.8
Scientific Instruments	19.8	16.5	16.8	15.4
Fabricated Metals	14.3	12.9	11.7	11.6
Chemical and Allied Products	13.5	17.4	12.7	16.6
Rubber & Misc. Rubber Products	12.8	13.0	12.1	11.7
Paper & Allied Products	9.8	12.0	8.3	10.6
Textile Mill Products	9.0	8.2	7.9	7.4
Misc. Manufacturing Products	7.1	8.2	6.8	7.4
Stone, Clay and Glass Products	5.4	7.3	5.8	7.2
Printing & Publishing	4.5	4.3	4.2	4.2
Lumber & Wood Products	4.2	8.8	3.4	8.3
Leather & Leather Products	3.7	8.8	3.7	6.8
Food & Kindred Products	3.4	5.0	2.3	4.8
Furniture & Fixtures	4.2	2.8	2.7	2.7
Apparel & Other Textile Products	2.3	3.6	2.1	3.0
Tobacco Products	0.0	12.1	38.7	14.6
Petroleum & Coal Products	0.0	9.1	3.2	7.8
All Industries	17.2	13.0	15.5	11.9

+Industries are listed in order of size (exports as percentage of total industry) in the state of Connecticut.

Note: Includes employment in the manufacture of goods that become components of other goods that are exported.

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1984 and 1986, Tables 4a and 5a.

Almost 30 percent of New England's exported manufactured goods and 2 percent of the nation's are made in Connecticut. In 1986, more than 17 percent of all Connecticut's products were exported to foreign nations. That is slightly more than the New England average and substantially more than the U.S. average (See Table 4).

TABLE 4
Value of Manufacturing Industries Exports
New England and the U.S.: 1984 and 1986

	1984				1986			
	Value of Exports ($'s in millions)	Exports as % of Total Shipments	Share of N.E. Exports (in %)	Share of U.S. Exports (in %)	Value of Exports ($'s in millions)	Exports as % of Total Shipments	Share of N.E. Exports (in %)	Share of U.S. Exports (in %)
CT	5,435.5	15.6	30.0	2.0	6,186.0	17.2	29.6	2.1
ME	1,215.0	12.2	6.7	.5	1,393.0	13.8	6.7	.5
MA	8,767.6	15.0	48.4	3.3	9,724.7	15.9	46.6	3.3
NH	1,128.8	12.9	6.2	.4	1,661.7	17.6	8.0	.6
RI	946.4	11.1	5.2	.4	1,068.9	12.7	5.1	.4
VT	617.2	16.2	3.4	.2	833.9	20.1	4.0	.3
NE	18,110.5	14.5	100.0	6.8	20,868.2	16.2	100.0	7.1
US	268,278.0	11.9		100.0	294,339.5	13.0		

Note: Figures may not add up due to rounding.

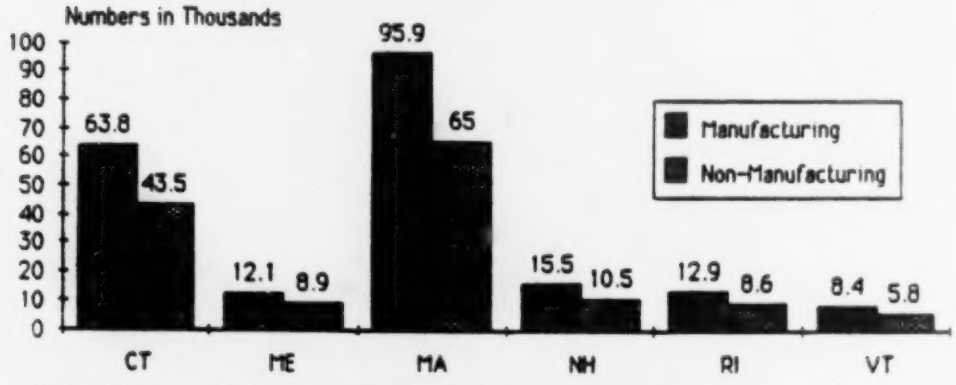
Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1984 and 1986, Tables 4a and 5a.

Employment Related to Manufactured Exports

Throughout New England, export-related industries accounted for over 350,900 jobs in 1986, 12.5 percent more than in 1984. Approximately 208,600 of these jobs were in manufacturing industries, which directly produced the exports, while 142,300 were in export-related jobs in industries including transportation, communications, agriculture and business services (these same industries also export). Although New England is home to only 5 percent of the nation's population, it accounts for almost 8 percent of U.S. export-related employment. In addition, New Englanders hold 9 percent of all U.S. export-related manufacturing jobs (See Figure 1).

FIGURE 1

Employment Related to Manufactured Exports: 1986



Note: Includes employment in the manufacture of goods and services that are components of other goods that are exported.

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1986, Table 2a.

In 1986, approximately 107,300 Connecticut jobs were export-related, and the state ranked first in the nation in export-related employment as a percent of total civilian employment. Connecticut also ranked first nationally in this capacity in 1980 and 1984 (see Table 5 below). Connecticut industries in 1986 accounted for almost 31 percent of New England's export employment.

TABLE 5
Employment Related to Manufactured Exports in New England and the United States: 1980, 1984 and 1986

	Export-Related Employment*								
	In Thousands			As Percent of Total Civilian Employment			Rank Among 50 States+		
Area	1980	1984	1986	1980	1984	1986	1980	1984	1986**
Connecticut	105.8	96.9	107.3	6.7	6.0	6.5	1	1	1
Maine	19.5	18.8	21.0	4.2	3.6	4.0	28	22	22
Massachusetts	151.4	144.9	160.9	5.5	5.0	5.5	11	3	2
New Hampshire	23.0	21.6	26.0	5.4	4.5	5.2	13	8	7
Rhode Island	25.4	19.1	21.5	5.9	4.3	4.5	5	11	13
Vermont	11.2	11.1	14.2	4.7	4.4	5.1	20	9	8
New England	336.3	312.6	350.9	5.5	5.0	5.5			
United States	4,808.3	4,096.7	4,576.6	4.8	3.8	4.1			

*Includes employment in the manufacture of goods and services that become components of other goods that are exported.

+Rank order is of export-related employment as percent of total civilian employment.

Source: U.S. Bureau of the Census, Annual Survey of Manufactures, Origin of Exports of Manufactured Products, 1984 and 1986, Table 2a, and 1981, Table 2b.

New England Trade With Canada

State and regional policymaking is hampered by a lack of timely U.S. data on imports and exports. Although U.S. Bureau of the Census data provide descriptive information about employment in export industries and the value of those industries' products, the data is old, and little is known about the current scenario. In addition, little is known about the import side of the trade equation at the state level.

The Canadian Government, however, provides data on import/export trade among all the Canadian provinces and U.S. states within three months of the close of each calendar year.

The Canadian Consulate located in Boston provided 1987 figures for the following analysis, including the following table (Table 6) which shows that although exports from Connecticut to Canada decreased slightly from 1986 to 1987, Canadian exports to Connecticut decreased more substantially, and the trade deficit decreased by more than $14 million.

TABLE 6

New England State Trade with Canada: 1986 and 1987

(in millions of U.S. dollars)

	1986			1987			1987 over 1986 % Increase in Exports to Canada
	Imports from Canada	Exports to Canada	Trade Balance	Imports from Canada	Exports to Canada	Trade Balance	
CT	850.4	830.7	-19.7	829.1	823.7	-5.4	-.8%
ME	766.4	256.6	-509.8	995.3	262.8	-732.5	2.4%
MA	2,358.6	1,462.8	-895.8	2,706.4	1,773.9	-932.5	21.3%
NH	310.9	128.4	-124.6	244.6	139.0	-156.1	11.5%
RI	465.0	128.4	-336.6	244.6	139.0	-105.6	8.3%
VT	802.0	190.4	-611.6	1,034.2	367.8	-666.4	93.2%
NE	5,553.3	3,055.2	-2,498.1	6,173.4	3,574.9	-2598.5	17.0%

Note: Figures may not add up due to rounding

Source: Statistics Canada, "Domestic Exports/Imports to/from the United States, January to December 1987 (provided by the Canadian Consulate, Boston, MA); New England Council, "The U.S.-Canada Free Trade Agreement: A Study of the Costs and benefits to New England," March, 1988 (used the same data for 1986 provided by the Canadian Consulate.

Total trade between Connecticut and Canada consisted of 51 percent shipments from Canada in 1986 and 50 percent in 1987. Connecticut has the most balanced trade relationship with Canada of all the New England states.

A 1986 comprehensive trade profile for Connecticut and Canada was prepared by the Northeast-Midwest Institute and published by the New England Council (See Appendix).

The New England Council report suggests the U.S.-Canada Free Trade Agreement will benefit New England overall, and the Connecticut economy is expected to benefit significantly because well-established export industries including electronics, telecommunications products, industrial machines and scientific instruments, will benefit from the removal of Canadian tariffs.

Because the U.S. export boom started in mid-1987 and continued through 1988, the 1988 Canadian data should prove most interesting. NEBHE staff will obtain and analyze this 1988 data as it becomes available, and incorporate it into briefing materials for Connecticut legislative leaders later this year.

Important changes also are underway overseas. The integration of the Common Market economies of Western Europe into a single continental economy in 1992 could provide new advantages for American businesses selling products in Europe, if they begin preparing now.

Potential Export Growth Among New England Small Businesses

Over the past 10 years, small businesses have been viewed as a key source of the nation's innovation and jobs. New England is unique among U.S. regions in that it is dominated by many small advanced-technology companies rather than large corporations. Data recently released by the U.S. Small Business Administration (SBA) show that small and medium-sized businesses make up approximately 97 percent of all businesses in New England and 98 percent of all businesses in Connecticut. It may be New England's small businesses that

provide the greatest potential for growth in regional exports.

Employment in New England small businesses increased 25 percent from 1976 to 1984; and small businesses provided 50 percent of all jobs in the region from 1982 to 1986.

The SBA estimates that 11,000 small businesses in the leading export industries of the nation have the capacity to export, but are not yet actively doing so.

Indeed, small businesses face special challenges as exporters. Companies with fewer than 20 employees often find exporting virtually impossible, in part, because they lack professional expertise in overseas markets. Obstacles include: foreign languages, time zones, taxes, regulations, international licenses and patent considerations, tariffs, customs inspection, laws, transportation and distribution systems, and varying cultural business practices.

Likewise, small businesses often lack the capital to sustain export operations through periods when the U.S. dollar's value is high relative to the currency of the importing nation. Although small businesses have lower levels of working capital than large corporations, they incur high overhead costs when beginning an endeavor. To make matters worse, export financing is very difficult to obtain, particularly for first-timers. And small businesses are often viewed as greater risks for financing.

Nonetheless, New England small businesses do dominate the advanced-technological industries that hold the greatest potential for export trade expansion and overall economic development. It behooves the region to nurture these companies.

Findings/Recommendations

A review of the Connecticut economy in an international context suggests great promise, as well as certain key considerations for meeting the challenge of international economic competitiveness.

- U.S. citizens, in general, suffer from international myopia, and most lack a basic understanding of international issues.
- Basic skills of U.S. entry-level employees are often not as high as basic skills of entry-level employees in other developed nations. Through attention to curriculum, higher education can foster long-term strategies to help the region address this issue, and enhance our competitiveness in international markets.
- Although Connecticut in 1986 led the United States in export-related employment as a percentage of civilian employment, the degree of involvement is small. That first-in-the-nation figure was only 6.5 percent. Strategies must be designed to nurture industrial expansion in an international context.
- U.S. data regarding the international economic position of the states and their industries is terribly outdated at the time of its release. Steps should be taken to generate better data on a more timely basis to aid state and regional policymakers in developing the international dimensions of their economies.
- At the regional and state levels a large number of small businesses are a dominant economic force, and these small businesses have certain competitive features that make them well-suited for international trade. But many of these small companies have not begun exporting. They may depend on other organizations for counseling, training, data analysis and market research, financial assistance, opportunities to attend trade shows and other services. A wide variety of such services exist. But the higher-education community, government and trade-related organizations must work together to further strengthen these businesses as they approach the international arena.

III. International Trade Programs in Connecticut

National, regional, state and local initiatives to enhance international economic competitiveness have been designed by governments, businesses and trade associations, as well as institutions of higher education. Although the programs vary widely, they generally aim to bolster economic development so that an overall competitive advantage can be sustained, or they specifically promote international trade.

Federal Trade Resources

On the federal level, international trade programs are sponsored by 10 agencies: the Agency for International Development, the departments of Agriculture, Commerce, State and Education, the Export-Import Bank, the Overseas Private Investment Corporation, the SBA, the Trade and Development Program and the Office of the U.S. Trade Representative.

A recent publication of the SBA is a must for all state and regional organizations as well as institutions of higher education that provide international trade counseling or technical assistance. The SBA's Exporter's Guide to Federal Resources for Small Business (1988) outlines the multitude of federal programs designed to provide financial and/or technical support to U.S. companies seeking entry into or expansion in international markets. It is an excellent resource for Connecticut's small and medium-sized companies and for those advising them on the export process.

Two federal agencies involved in international trade deserve special attention. They are the Department of Commerce's International Trade Administration (ITA) and the SBA.

The International Trade Administration

ITA, established in 1980 to promote world trade, is the official U.S. government organization coordinating all issues concerning trade development, international economic policy and programs in the area of international commerce and import administration.

Two of ITA's four offices are charged with increasing export awareness and stimulating the export of goods and services. These offices provide individual export counseling, sponsor trade missions and fairs, develop catalog and video catalog exhibitions, provide electronic information or foreign sales leads, and conduct conferences and seminars to help companies enter new markets.

Through ITA, last year 2,800 companies participated in 142 overseas trade fairs and missions reaching almost 5 million prospective buyers, agents and distributors. Projects are generally coordinated with local offices of the SBA, state agencies and area trade associations. ITA has 48 offices in the United States, as well as posts in more than 120 foreign countries. Connecticut's ITA office is located in Hartford.

ITA's biweekly publication, called Business America, is a useful tool for state and local leaders involved in international trade development as well as for current and future exporters.

Small Business Administration

The SBA offers a multitude of services for the small-business person, as well as for individuals contemplating the creation of a small-business enterprise. Many SBA services are delivered locally through coordination with colleges and universities. While some SBA services are designed to assist small businesses with management in general, others are specifically geared toward providing international trade assistance, both financial and technical.

The SBA's Small Business Institutes (SBIs) offer free guidance and assistance to small businesses. The SBIs are staffed by college seniors and graduate business administration students (for academic credit) and their faculty advisors under SBA guidance. SBIs are located at Central Connecticut State University and the University of Connecticut at Storrs.

Small Business Development Centers (SBDCs) draw upon federal, state and local government resources, as well as the private sector and universities to provide small businesses with management and technical assistance, counseling and practical training. SBDCs in Connecticut are coordinated by the University of Connecticut's School of Business Administration. SBDC satellite offices are located at Quinebaug Valley Community College (Danielson); Southwestern Area Commerce and Industry Association (Stamford); University of Bridgeport; Univerisity of Connecticut, Groton campus; University of Connecticut, Waterbury campus; and University of Connecticut, West Hartford campus.

Of all SBA programs, the International Trade Counseling and Training Program is the most specifically related to international trade. Established in the 1970s, this program provides one-time free legal advice for small and medium-sized companies that are new to exporting, as well as counseling and financial assistance for managers of small businesses considering entry into international markets or expanding current export operations. Much of this activity is managed by the SBA's Business Development staff and coordinated with the Department of Commerce's International Trade Administration.

Regional Initiatives

Certain regional organizations are involved in promoting international trade by New England businesses. They include the Small Business Association of New England, Massport's Trade Development Unit and the International Business Center of New England.

Small Business Association of New England

SBANE, a member organization for small businesses in the region maintains an international trade committee, called SINTRAC, which meets monthly to discuss problems and issues pertinent to exporting. This committee's 36 members are drawn from small businesses that are already exporting, as well as representatives of the U. S. Department of Commerce, SBA, and appropriate state offices throughout New England. SINTRAC members also include representatives of a small number of business organizations serving the international trade community.

SINTRAC projects include training programs in export administration (co-sponsored with the International Business Center of New England), and export dialogue programs involving chief executive officers who are experienced in foreign trade and willing to share their experience in marketing and distribution, and shed light on their relationships with bankers, agents, brokers and freight forwarders. In 1989, SBANE's annual New England Business Conference, for the first time, will include an international trade component, with general sessions on international trade, selling products overseas, financing international business, developing international joint ventures, the U.S.-Canada Free Trade Agreement and the European Community in 1992. The international component is likely to become a permanent part of the annual meeting.

Massport's Trade Development Unit

For more than a decade, the Trade Development Unit of Massport has provided referrals, research, marketing assistance and general guidance to small and medium-sized New England manufacturers seeking to begin exporting or expand current export operations. Each year, Massport assists more than 100 businesses through market research and analysis of products and countries. Massport also sponsors trade shows, trade missions and business meetings, and provides general information on international business and export opportunities. In addition, for companies doing market research, Massport operates an international business library located at the World Trade Center in Boston. While the majority of Massport's clients are based in Massachusetts, 10 percent to 25 percent are drawn from the remaining five New England states. Massport maintains international trade offices in London and Tokyo.

The International Business Center of New England

Established in 1956, the International Business Center of New England sponsors seminars and programs for businesses interested in international trade. The center coordinates its efforts with other regional organizations, as well as those serving the Greater Boston area.

Other Regional Programs

Several other regional organizations have provided policy studies and data analysis; others have coordinated workshops, seminars and meetings related to the issue of international economic competitiveness. These include the New England Board of Higher Education, the New England Caucus of State Legislators, the New England Council and the New England Governors' Conference.

State Level Strategies in Connecticut

Connecticut has evaluated its strengths and weaknesses in long-term economic development, and effectively designed programs in response. The state has recognized the importance of small and medium-sized firms in its economy, particularly those in the high tech arena. And global economic competition has prompted the current state administration to launch a variety of initiatives to foster innovation and state-of-the-art technological development for long-term economic advantage.

Financial Incentives for General Economic Development

The Connecticut Product Development Corporation (CPDC), the first venture capital agency in the country, was established in 1973 to stimulate and encourage new industry in the state. Like all state-supported venture capital funds, CPDC assists entrepreneurs who have good ideas, but are considered too risky to secure financing from more traditional sources.

CPDC manages two funding programs. One program provides risk capital for the development phase of a definable production process which is new to the company undertaking it. Payback to the fund is derived from a royalty based on the sale of the product. The second program, called the Connecticut Innovation Development Loan Fund, goes a step further. Companies that have developed a new product (with or without state assistance) are eligible for low-interest loans to bring the products or processes to market.

CPDC has funneled more than $20 million to Connecticut innovators. In 1987 alone, CPDC provided $2.6 million in funds and received $376,000 in royalty income from previously financed projects.

In 1987, the state established the Connecticut Seed Venture Fund. The fund began with $5 million in state funds that were matched by seven private corporations, including Yale University, to provide early-stage financing that

is generally not available through traditional venture capital and other commercial funding mechanisms.

More traditional state funding mechanisms are managed by the Connecticut Development Authority, which provides low-cost, long-term fixed-asset financing to help companies undertake new capital expansion through direct loans, industrial bonds, tax-exempt revenue bonds and mortgage insurance programs. The Authority also provides financial and tax incentives for capital investment in urban areas. Urban enterprize zones have been established in Bridgeport, Hartford, New Britain, New Haven, New London and Norwalk. Connecticut businesses are entitled to tax abatements, tax reductions, tax deferrals and grants for each new job created.

In addition, the Authority supports low-cost industrial incubater space and high tech parks across the state. The high tech parks provide firms with access to resources of the state's research universities. Connecticut also sponsors a set-aside program that reserves a percentage of state government purchases and contracts for small companies and for women-owned and minority-owned businesses. More than $2.3 million was expended in 1987 through the Small Business Loan Program.

In 1987, Connecticut created its own version of the federal government's Small Business Innovation Research (SBIR) grant program with $500,000. By assisting companies between stages of funding through the federal program, the Connecticut SBIR Assistance Grant Program offers incentives to small businesses to apply for federal funding.

Financial Incentives for Heightened R&D and Technology Transfer

In 1983, the governor created a High Technology Council which recommends ways to strengthen science and math programs in elementary and secondary schools, and proposes public/private initiatives to foster high tech

development in the long term.

The Council's preliminary report recommended that the Connecticut Academy of Science and Engineering (CASE) be authorized and funded to assess the state's high tech strengths and offer recommendations to foster development of such strenghts. The CASE report identifies seven areas of strength--aerospace, biotechnology, computer applications, energy systems, materials technology, medical technology and telelcommunications. Based on this report, the Cooperative High Technology Research and Development Grants (CHTRDG) program was funded by the General Assembly in 1985.

CHTRDG, which is managed by the Connecticut Department of Higher Education, is designed to encourage cooperative research and development between Connecticut's private sector and its academic research communities. Funded at $2 million annually by the state, grants are to be matched by the private sector for joint research projects conducted at an industrial site or college campus, involving members of both communities.

The High Technology Council report also recommended creation of a Centers for Excellence program. The program was created by the state and also is managed by the Department of Higher Education. Four centers were created in 1985. By the third year of the program, 11 centers had received funding. All the centers were based at state universities or community colleges and funded at a total of $2 million by fiscal 1988. However, continued funding was not included in the governor's 1989 budget.

In 1986 a High Technology Project and Program Grants initiative was established to provide state colleges and universities with resources to upgrade their technical equipment and facilities in support of high technology research and education. The program is funded at $2 million annually.

More recently, the Collaborative High Technology Program for Public and Independent Colleges, funded by the state at $750,000 in 1988, has purchased

specialized equipment to be shared by both types of colleges. And a high technology doctoral fellowship program and high technology scholarship program were funded at $193,000 and $200,000 respectively.

Business Services and Technical Assistance

Connecticut's Department of Economic Development offers computerized information for industrial site selection, a wide variety of support services for small businesses (Connecticut was ranked number one in 1984 in its attractiveness to small businesses by INC. magazine), technical assistance programs for state manufacturers, and job training and employment assistance.

The most unique of Connecticut's assistance programs (its establishment was also recommended by the Governor's High Technology Advising Council's Report in 1983) is the Connecticut Technology Assistance Center (CONNTAC). CONNTAC is a one-stop clearing house of information regarding all public and private services, programs and resources available to help high tech companies establish or expand orperations in the state. CONNTAC sponsors informational forums that involve business, labor, educaton and government, as well.

Science and High Technology Parks

Connecticut has established two major high technology parks in close proximity to its two major research universities. The development of Science Park was initiated in 1982 when the Olin Corporation donated its abandoned firearms manufacturing plant in New haven to the Science Park Development Corporation, a non-profit corporation formed by the city of New Haven, Yale University and Olin with a substantial infusion of state funds. The National Governors' Association views Science Park as a model for cooperation among government at all levels and businesses and universities. About 60 percent of Science Park companies are technology-based, involved in areas such as

artificial intelligence, engineering, biotechnology, research and development, scientific instruments, high tech communications and computer design.

The Connecticut Technology Park (Conn Tech Park) at the University of Connecticut in Storrs is currently under development. Adjacent to the campus, Conn Tech Park will encompass 390 acres and include industrial research sites, a business incubator building, and a 125-room hotel and conference center. A key feature will be an Environmental Research Institute, designed to tap academic and business expertise in dealing with hazardous waste problems associated with high technology.

Jobs for Connecticut's Future

A collaborative project called Jobs for Connecticut's Future (JFCF) was designed to address the challenges of education and job training in the 1990s. Completed in 1986, JFCF was one of the earliest comprehensive studies by public and private groups, and the first in New England. JFCF was designed to make projections on what kinds of jobs would be available in the state over the next decade, and assess the skills, training, retraining and education that would be needed to prepare Connecticut residents for these jobs. The JFCF also would forge a broad and meaningful partnership between the public and private sectors in meeting the study's challenge.

The study's major recommendations urged existing business, labor, education and government organizations to coordinate efforts to upgrade educational levels in the state.

A pilot project has been initiated in Bridgeport to move unemployed persons into the job market utilizing area educational resources through cooperation with the state. In addition, the Department of Labor is trying to establish a single assessment system to be used statewide for entry-level employees needing basic skill development, whether they enter the system

through business and industry, a technical institute, community college, or other source for basic skills training. And finally, the state funded the creation of a neighborhood skills center known as Jobs New Haven in Science Park to operate in coordination with the New Haven Job Center.

Most JFCF recommendations have not been implemented at this point. However, a commission is being created by the governor under the coordination of the Connecticut Department of Labor to coordinate and expand training and retraining initiatives to meet new labor force challenges.

International Trade Initiatives

Connecticut has been a pioneer in terms of export assistance programs. Such programs were launched through the state Department of Economic Development as early as 1975. In addition, Governor O'Neill in 1981 became the first chief executive of any state to lead a state mission to Europe. Such efforts have paid off. Connecticut ranked 1st nationally in export-related employment in 1980, 1984 and 1986. Also, in 1984, the state ranked 5th in export-related manufacturing employment, and 5th in the total value of exports.

The Department of Economic Development's Division of International Trade (DIT) is charged with promoting export of Connecticut products in the international marketplace. DIT assists export businesses through overseas trade shows and missions, one-on-one counseling, and a computerized trade lead program. It also co-sponsors seminars and conferences on exporting with the various other international trade organizations and agencies and maintains overseas offices in Frankfurt and Tokyo.

DIT also provides an innovative export-finance program for new exporters, as well as a licensing and joint venture program to expose Connecticut companies to foreign companies.

Connecticut World Trade Association (CWTA)

Although only two years old, the CWTA offers various services to its members, including trade information, educational programs on exporting, translation services, trade missions, telex and facimile services and computerized database information. Last year, the association joined the International World Trade Electronic Network System that gives members access to trade lead information of 157 member-associations throughout the world. Using a computer modem, CWTA members can access the system from their own offices making and obtaining offers to buy and sell products. A small seafood distributor recently placed an offer to sell on the system, and within four working days had 10 inquiries. CWTA also serves as the umbrella organization for all statewide trade-related organizations, publishing a comprehensive calendar of meetings, trade missions, trade shows, seminars and workshops offered by the different groups.

Connecticut District Export Council

Hartford is home to one of 51 district export councils nationwide that operate under the guidance of the U.S. Department of Commerce. Members include leaders in commerce, industry, academia, and local government that have close association with international trade. Councils serve to provide feedback from businesses regarding the U.S. Department of Commerce International Trade Administration. In addition, these councils sponsor workshops and seminars on exporting and help arrange export counseling for beginning exporters and potential exporters.

World Affairs Center

The World Affairs Center focuses on cultural affairs and hosts foreign officials who visit Hartford to meet their American counterparts in industry,

government and other fields. Seminars on export issues are among the center's educational and public affairs programs.

International Trade Clubs

Several informal trade clubs are located throughout Connecticut, and include the West Connecticut International Trade Association (Greens Farms), the Connecticut Foreign Trade Association (Bridgeport) and the Western Connecticut International Trade Associaiton (Norwalk).

Export Assistance Centers

The Connecticut Export Assistance Training and Promotion Program (CEATPP), located at Quinnipiac College in Hamden was established by the Department of Economic Development, the Connecticut District Export Council and Quinnipiac College. Through this program international business students work with small Connecticut companies to conduct export feasibility studies and to develop overseas marketing plans and export operations.

The Small Business Export Center, part of the University of Connecticut at Storrs Small Business Development Center, is now in its third year of operation. University seniors and graduate students enrolled in international affairs and international marketing courses undertake projects to determine the export feasibility of a particular company's product, and develop overseas marketing plans and export strategies for the products. The center also holds export-related seminars and workshops and provides one-on-one consulting.

Other Resources for Interational Trade Promotion

On a consultant basis, several specialized services are available to businesses wishing to export. They include: export management and export trading companies that serve as representatives to manufacturers;

international trade consultants; customs house brokers; international freight forwarders; translation services; and the international departments of banks.

Foreign consulate and other government agencies located in Connecticut include the Consulate for the Kingdom of Lesotho and the Singapore Economic Development Board in Westport.

Export information and assistance is also provided at the local level through Chambers of Commerce in Hartford, Danbury, Glastonbury, Greenwich, Meriden, Middlesex County, New Britain, and New Haven and through the Connecticut Small Business Federation in Farmington.

Findings

Connecticut, like other states across the nation, is now building the infrastructure necessary to pormote international trade. More than most other states, Connecticut has been strong in state financial incentives that nurture its high tech strengths, most recently in the area of biotechnology. Though some are small in size, collectively these financial incentives are quite impressive in combining resources that can be brought to bear on the problems of promoting long-term economic and trade development.

IV. HIGHER EDUCATION AND INTERNATIONAL ECONOMIC COMPETITIVENESS

Because New England's economy increasingly is fueled by advanced technologies, skilled labor is critical to continued growth. International economic competition adds to our demands for a well-educated workforce, heightened levels of R&D and subsequent technological innovation. But there are signs indicating we are falling behind our economic competitors in these fundamental areas. On a national basis, the facts are disturbing:

Education and Training

- Between 20 million and 30 million adults in the United States are considered functionally illiterate.
- Participation and achievement by U.S. elementary and secondary-school students in science and math lag when compared with the performance of previous years and with the performance of students of other nations. Our middle and high school students have scored at or near the bottom on international math exams for the last several years. In addition, high school graduates in both Japan and West Germany, our major competitors, are stronger in basic educational skills. Merry I. White, an analyst of Japanese educational policy, suggests that Japanese high school graduates are as well educated as American college graduates and that any worker at a Japanese factory can be expected to understand statistical material, work from complex graphs and charts and perform sophisticated math.
- Although we boast that 50 percent of our high school graduates go on to college, only 70 percent of U.S. students complete high school, compared with Japan's 98 percent. "Their bottom half is beating our bottom half" according to economist Lester Thurow.
- U.S. professional service industries complain about the dearth of qualified workers for entry-level jobs usually filled by high school graduates. Likewise, U. S. manufacturers are finding it difficult to recruit workers who can understand robotics and computers.
- An estimated 75 percent of today's American workforce will need retraining by the year 2000.

- Recent studies suggest that U.S. universities are not turning out enough scientists and engineers--particularly at the master's and doctorate degree levels--to meet new demand in the leading-edge areas of high technology and advanced production systems. The number of engineering doctorates decreased from 2,500 in 1970 to 1,280 in 1985. In addition, only 53 percent of the engineering doctorates awarded by U.S. colleges were awarded to U.S. citizens or permanent residents. And, a shortage of top-quality applicants is expected to greet the retirement of a generation of aging science and engineering faculty.

- Top-quality students are being steered toward the lucrative professions of finance and law, creating a brain drain in manufacturing industries. The study of manufacturing processes is being neglected.

International Awareness

- The United States is one of the few developed nations where students routinely graduate from high school without competence in a second language. According to figures provided by the Southern Regional Board of Education, only 8 percent of universities require foreign language for admission, and only 5 percent of college graduates are fluent in a second language. In the United States, a student can earn a doctorate without ever having taken a foreign language course. Nonetheless, the language of trade remains the language of the customer. If we do not understand the customer, we will be unable to trade our goods, services and ideas.

- U.S. students, workers and consumers lack understanding of global geography and of the cultural and political differences between nations. Economic development and trade association leaders told NEBHE staff that this lack of international cultural awareness is one of the most significant hurdles they face in encouraging export trade by New England businesses.

R&D Investment and Technology Transfer

- The U.S. leadership position in research and development (R&D) expenditures of 25 years ago faces a serious challenge. In 1962, the U.S. spent 2.7 percent of GNP on R&D, compared with 1.5 in Japan and 1.3 in West Germany. By 1985, the U.S. figure was still 2.7, but Japan's was 2.8 and West Germany's was 2.7.

- Non-defense R&D expenditures by the United States are well below both Japan's and West Germany's. Japan spent 2.8 percent of GNP on non-defense R&D in 1985, and West Germany spent 2.5 percent. The United States spent only 1.9.

- Although the United States leads the world in advanced technological industries, its annual growth rate between 1972 and 1985 was 7.6 percent, compared with Japan's 14 percent, suggesting Japan is more effective in technology transfer for high-quality product development.

- 1987 marked the second consecutive year that foreign firms topped the list of U.S. patents awarded. Japanese firms were first and second, bumping General Electric to third.

Education In The Global Economy

International competitiveness requires educational effectiveness. Having earned worldwide respect, our systems of higher education have at hand tremendous resources to share in solving the states' problems of economic competitiveness on several levels.

Many of the problems we face in terms of lagging worker competence and lacking international awareness have traditionally been viewed as problems of elementary and secondary education. But we can no longer afford to make that distinction. The strength of the U.S. system of higher education depends on the strength of education at lower levels. International economic competitiveness rests on the strength of both systems. For this reason, viewing the educational process as a continuum will allow more effective long-term solutions to the problems presented by the global economy.

In terms of basic literacy skills and educational level, the nation's workforce presumably falls around the middle when compared with other industrialized countries. But as our products become more highly technological and our markets become global, literacy demands increase dramatically. And the United States trails even some developing countries in initiatives on literacy, basic education and worker retraining. As a result, the United States faces competition from developing countries, which not only have lower labor costs, but also are making stronger efforts to train skilled, literate workers.

Literacy and Education in Connecticut

Connecticut is ranked 25th in the United States and 5th in New England in terms of adult literacy. Clearly, adult Illiteracy is a serious problem in the state. Approximately 12 percent of the adult population was considered illiterate in 1985.

On the other hand, Connecticut has made great strides in decreasing the high school drop-out rate through the 1980s. High-school graduation rates increased from 71 percent of eligible students in 1982 to 90 percent in 1986. Average SAT scores, have also increased--by 12 points between 1982 and 1988. In addition, greater numbers of students took the SATs: 69 percent did in 1982, and 81 percent did in 1988. By 1988, Connecticut ranked number one nationally in the percentage of students taking the SAT's and 6th in terms of its average score. Connecticut leads the way in New England in meeting the Japanese challenge of a 98 percent graduation rate.

At the higher education level, Connecticut ranked third nationally and first in New England in 1980, in percentage of population age 25 and older with a college education. While the national average was 16.2 percent, and New England's average was 19.2 percent, Connecticut's was 20.7 percent.

In 1986, Connecticut's higher-education enrollment as a percent of 18 to 24-year olds was 44.

A Long-Term Proposition

State, business and education leaders should realize that raising the educational level of the population is a long-term proposition, and quick fixes simply will not work. Raising the educational levels of Connecticut's young people in the short-term will help cope with adult illiteracy in the long-term, while leaders devise strategies to deal with the adult illiteracy that now exists.

It appears that both public and private universities in Conecticut are serving the state well, in terms of engineering degrees awarded. The University of Connecticut, the University of Bridgeport, the University of New Haven and Yale University have increased the number of graduates considerably from 1982 to 1987. There was a decline in one area--the number of bachelor's degrees awarded decreased by 23 at the Univesity of Connecticut. Bachelor's, master's and Ph.D awards increased in all other cases. Only the University of Connecticut and Yale University award doctoral degrees in engineering.

Connecticut Initiatives to Heighten Levels of Education

The Corporation for Enterprise Development gave Connecticut an "A" on its 1988 state-by-state report card for state educational initiatives. The state was ranked 8th nationally in this capacity. Public education spending for grades K-12 and higher education are not very high when compared to the actual wealth of Connecticut's residents, but teachers' salaries increased substantially between 1986 and 1987 and pupil teacher ratios are quite low. As a result, Connecticut ranked 3rd and 1st nationally in these last two respective areas.

In the area of adult literacy, Governor O'Neill established a literacy coalition in 1987 to help coordinate groups working on illiteracy. The state Bureau of Adult Education has recently assessed collaborative ventures using state and federal resources and business/industry partnerships to provide adult basic, general education development and English-as-a-second-language instruction. Increasingly, businesses have been turning to the state for assistance in providing on-site instruction for their employees.

Programs have been held at various companies, including IBM in Norwich, for instruction in the use of basic-skills software; and at the Sikorsky Aircraft Co. in Stamford for General Education Development instruction. In

New Haven, the local school system and health care union have collaborated with the Bureau of Adult Education to provide General Education Development instruction at a local nursing home, which is granting release time to its employees.

Improvement of public schools was the No. 1 public policy priority of Connecticut's business, government and education leaders surveyed in NEBHE's 1987 Future of New England Survey. Maintaining a strong economy ranked second out of nineteen issues for consideration. Improving public schools was further emphasized when leaders suggested that higher education might more effectively join in partnership with the broader community to improve the quality of teacher education. In addition, leaders emphasized the importance of upgrading the skills of the workforce as an important policy priority. Connecticut's emphasis upon developing initiatives that will foster high tech industrial development is now leading the state to workforce-related issues. Promoting collaboration between the various educational resources has become a recent priority.

New Connecticut College activity serves as a model for the type of educational initiatives that higher education can devise to cut across educational levels. The College is assisting elementary and secondary schools to upgrade education of Connecticut residents, by establishing a summer institute for minority high school students and faculty who spend three weeks on campus at the Institute for Minority Advancement. Connecticut College has also established Academic Alliances between school-college faculty to upgrade academic curricula and share academic courses across educational levels.

Lack of International Awareness

In 1987, NEBHE completed a comprehensive study of the ways New England college and universities were adapting curricula and related activities to provide the new understanding and competencies that are necessary in a global economy. Using a case study approach, NEBHE examined 40 colleges and universities, including public and independent two-year and four-year institutions, across the region. NEBHE considered institutional planning, business and liberal arts curricula, foreign languages, area studies, internationalization within various academic disciplines, foreign-student enrollment, study-abroad programs and library resources. The study found that the change occurring along the international dimension was one of the most powerful substantive developments in the history of higher education. But it also warned that more muts be done.

Campus-based International Initiatives

What follows is a sampling of campus-based activities to promote international awareness among Connecticut students:

- Yale University is host to 500 foreign researchers and senior scholars.
- The University of Connecticut, Connecticut College and Central Connecticut State University have taken a comprehensive approach to internationalizing various aspects of academic operations.
- Central Connecticut State University, in cooperation with the Connecticut World Trade Association, manages the World Trade Institute, the trade association's educational arm.
- Connecticut College provides fellowships for high school teachers of foreign language through its Academic Alliance Program.
- The University of Bridgeport has established a Council of International Fellows to advise the Board of Trustees on international matters with the purpose of ensuring that the University maintains a leadership position in international education.
- Demand for international business courses at the University of Connecticut has exceeded the university's ability to provide courses.

- An International Management Interest Group has been formed at Yale University, and more than 75 students have joined.

- Yale's School of Management offers a cross-disciplinary course in Business, Government and the International Economy.

- The University of Connecticut offers an "International Business in Connecticut: German Firms" as an introductory course in international business. Drawing upon the several German affiliates located in Connecticut, students are taught first hand by foreign CEO's. The course is available to liberal arts, business and marketing students.

- Quinnipiac College's International business program, managed by the International Business Center (see more detail in the following technology transfer and technical assistance section), provides students with a focus upon export marketing and finance. It also involves active internship and international exchange programs for students

- The University of Bridgeport has proposed a major in foreign trade and manages an International Institute for Language and Culture both to students and the Greater Bridgeport Community at large.

- Yale University reinstituted a two-year college-level language requirement of its students in 1981. More than 65 percent of total enrollment in foreign languages is by students going beyond the two-year requirement.

- With major foundation support, Yale University has organized a consortium of 11 major private institutions across the nation (five of which are in New England) to focus on problems of foreign language instruction.

- Both Yale and Wesleyan have very active Chinese language programs that also provide opportunities for study in Taiwan and mainland China.

- Yale University's Center for East Asian and African studies has been designated as a graduate resource center under Title VI of the Higher Education Act.

- The Yale China Association endowment helps provide support for faculty exchange.

- Both Yale and the University of Connecticut have been granted federal support for their Latin American Studies programs under Title VI of the Higher Education Act. Wesleyan offers an undergraduate major in Latin American Studies.

- University of Connecticut is considering the establishment of a Center for Venezuelan Studies.

- Yale University's library collection in Canadian Studies is considered one of the five strongest in the world.

- Wesleyan has established a Center on East Asian Studies.
- The University of Connecticut has established foreign relationships with 11 foreign universities throughout the world.
- Yale University has joined a new consortium participating in the KYOTO Program of Japanese Studies administered by Stanford University. It is for students with a strong background in Japanese language and culture.
- NEBHE manages the New England side of the New England/Quebec Student Exchange Program. The program enables students to study at Quebec institutions while paying tuition at their sponsoring home campuses. Eighteen institutions of higher education in Quebec and 36 public and private colleges and universities in New England participate. During the 1987-88 academic year, 42 students participated from the two regions.

Through early 1987, Connecticut colleges and universities, like their counterparts in the other New England states, had concentrated their internationalization efforts on curriculum development. Although these initiatives have been unique and impressive, comprehensive curricula planning typically has lacked focus on the global economy.

While foreign-language enrollments have risen sharply after a decade of decline, few business students study foreign languages. And there is very little global business perspective in liberal arts programs, even though most liberal arts students eventually go to work for companies, which are directly or indirectly involved in world trade.

In addition, study-abroad programs are generally available, but very few overseas internships focus on business. Likewise, very few post-doctoral research fellows are funded for overseas research positions. And those who do go overseas generally must complete a second post-doctoral assignment in the United States in order to be adequately connected to secure future employment. As a result, these research fellows are discouraged from going abroad.

Foreign-student Enrollment

Growth in foreign-student enrollment in New England as well as the nation has flattened during the 1980s in relation to the tremendous growth that took place in the 1960s and 1970s. But foreign-student enrollment in New England slowed to a lesser extent. The number of foreign students in New England grew from 23,191 in 1983-84, to 27,702 in 1987-88, less than 20 percent growth over the four-year period, but still substantial, compared with the national increase of 5 percent (339,000 to 356,000).

More striking is the relatively small number of Americans studying abroad. According to the Institute of International Education's 1986-87 "Open Doors" survey, 48,483 Americans were studying for credit abroad, compared to 349,609 foreign students studying for credit in the United States. Equally striking: While 80 percent of the Americans were studying in Western Europe and only 5.4 percent were studying in Asia, students from Asia represented about half of the foreign students in the United States. New England has proportionately more students from Europe and Canada and fewer from Asia than does the nation as a whole. Institutions in the three northern New England states have been especially attractive to Canadian students. The assymmetry of the foreign-student exchange is further revealed in how foreign and American students, respectively choose their fields of study.

Foreign students are learning an enormous amount about science, engineering and business management in the United States. U.S. students overseas are learning almost nothing about science and business in their host countries. Primarily, these U.S. students abroad are studying fields associated with U.S. undergraduate curriculum, such as Western history, philosophy and culture.

More must be done to encourage study-abroad in our institutions of higher education, not only in Western nations but throughout the world. In addition,

the foreign students here in New England could serve as tremendous resources of cultural knowledge not just for college students and faculty, but for middle-school and high-school students and the general public.

Business-Higher Education Lack Coordination

NEBHE's 1987 case study analysis of 40 New England colleges and universities suggests that the region's business, government, economic development and trade association leaders were increasingly focusing on international issues on a tract parallel to that of the region's colleges and universities, but that efforts by the different parties were rarely coordinated.

Although higher education has international resources relevant to the business community, and foreign investment tends to be attracted to areas offering educational advantages, New England communities had not yet developed business-higher education partnerships for international economic development.

In the area of R&D Investment and technology transfer, Connecticut can count more accomplishments than any other New England state in terms of partnerships among business, government and higher education.

R&D Investment and Technology Transfer

New England's leading edge in basic research is striking. But through the 1970s, the region relied upon informal relationships between university researchers and resulting spinoff businesses. Not until the early 1980s did economic policy-makers and research universities across the nation begin to understand the serious implications for all sectors when "regional" economies failed or stagnated. The result was a concentrated effort to enhance university-based technology transfer and technical assistance initiatives in order to nurture the diversification of local economies.

But because the recession of the early 1980s did not affect the New England states as severely as states in other regions, the promotion of technology transfer and technical assistance has lagged in this region. Now, as the region's economy seems to be peaking and international competition is intensifying, purposeful action is critical to sustaining long-term economic development.

The nation's long-term commitment to research and development has served as a seedbed for new industrial products and processes, innovative capacity and productivity gains. Federal funding of basic and applied research has been vital in sustaining a prosperous economy. It has also created a partnership among government, business and academia, which is responsible for our international leadership in scientific and technological discoveries. Since World War II, federal support for basic and applied research has grown substantially and New England organizations have been leading recipients of the federal funds.

The region's strong R&D infrastructure, particularly at the university level, allowed for the evolution of the computer industries of the 1970s and the biotechnology, artificial intelligence and software engineering industries developing in the 1980s.. Nurturing R&D is crucial for further state and regional economic development.

Connecticut's Share of Federal R&D

Between 1980 and 1985, federal R&D funding to Connecticut organizations increased. But in 1986, funding dropped by 22 percent from 1985 levels. Connecticut was ranked 16th nationally in federal R&D funding in 1985 and 19th in 1986.

Almost 60 percent of all federal funds awarded to Connecticut are from the Department of Defense (DOD). Almost 11 percent of the state's funds are

from NASA. Health and Human Services (HHS) funding as a portion of total funds to Connecticut is higher than both the New England and national averages, an indication of the state's strength in biomedical research. This HHS money includes funding by the National Institutes of Health. Moreover, HHS funds have increased from 15 percent of Connecticut's total dollars in 1980 to 21 percent in 1986. Connecticut's ranking improved from 14th in 1985 to 11th in 1986. Connecticut ranks among the top 20 states in three other funding categories: total funds from all agencies, DOD funds and NASA funds.

Although federal funds to colleges declined at a much smaller rate than they did to all organizations between 1985 and 1986, they did fall by 4.5 percent. Of total university-directed federal R&D funds in Connecticut, 65 percent are awarded by HHS, compared with a 40 percent New England average and 33 percent U.S average. While DOD represents 60 percent of federal R&D funding to all organizations in Connecticut, it represents only 4 percent of such funds awarded to colleges and universities, suggesting that industry is the major provider of DOD-related R&D in Connecticut, while universities are the major provider of health-related R&D. Approximately 16 percent of Connecticut's university funds are awarded by the Department of Education while almost 8 percent are awarded by the National Science Foundation. All other agencies comprise 4 percent or less of R&D funds to universities in Connecticut.

Four colleges and universities in Connecticut rank among the top 40 in New England in terms of university R&D obligations from all agencies: Yale University (3), University of Connecticut (6), Wesleyan College (23), and Southern Connecticut State University (38).

Yale and the University of Connecticut also rank among the top 75 universities nationally in this capacity. Although both dropped slightly from their 1985 rankings, Yale ranked 14th in 1986 with $130 million, while the

University of Connecticut ranked 67th with $43 million.

The University of Connecticut ranks 4th in New England in funds from the departments of Agriculture and Commerce, while Yale and the University of Connecticut rank 6th and 11th, respectively, in DOD funds to New England institutions. In Department of Education funds, U. Conn. Yale, Wesleyan, Southern Connecticut and the University of Bridgeport rank 6, 13, 23, 27 and 38, in the region respectively.

Yale ranks 2nd among universities in the region in funds granted by the Department of Energy, while Yale, the University of Connecticut and Wesleyan rank 1, 5 and 16 in HHS funds to the region. Finally, Yale University and the University of Connecticut rank 4th and 12th in NSF funds awarded to New England.

R&D Expenditures at Colleges and Universities

On the expenditure side, Connecticut colleges and universities fare much like the nation and region on the whole. Slightly more than 66 percent of R&D expenditures are form the federal government, while 21 percent are institutionally funded and 3 percent are funded by industry. State and local governments contribute a rather small share of R&D funding to Connecticut colleges and universities (2.2 percent). The New England average is 2.3 percent, but the national average is 8.4 percent.

Broken down by academic discipline, Connecticut's strength appears to lay in research into the life sciences. Almost 69 percent of all research is in the life sciences, while 14 percent is in the physical sciences and 6 percent in engineering. All other disciplines make up less than 4 percent of R&D expenditures.

Connecticut ranks 48th nationally in <u>total</u> R&D expenditures, 34th in non-federal R&D expenditures, 48th in industrially sponsored R&D expenditures

and 32nd in R&D expenditures by public colleges and universities. By the last measure, the University of Connecticut ranks 1st in New England.

Among independent institutions, Yale University is particularly strong. Nationally, Yale ranked 22nd in total R&D expenditures, 46th in non-federally funded R&D expenditures and 8th in R&D expenditures by independent universities.

National Institutes of Health Funding

In National Institutes of Health (NIH) funding--a key measure of biomedical research activities--Yale ranked 3rd nationally and 1st regionally, while the University of Connecticut ranked 62nd nationally and 9th regionally. Yale University's Medical School ranked 1st regionally and 3rd nationally while the University of Connecticut's ranked 55th nationally and 7th regionally. One Connecticut independent hospital, Hartford Hospital, ranked 100th in this capacity. Thirty-four colleges and universities in New England were awarded NIH funds.

Summary Remarks

Clearly Connecticut's colleges and universities are strong in life sciences and biomedically related research. These strengths are being nurtured through several state programs for economic gain. In addition, engineering and the physcial sciences hold promise for the state.

Technology Transfer and Technical Assistance

Several technology transfer and technical assistance initiatives have been generated by Connecticut universities themselves. Some are still in the planning stages. A sampling of Connecticut's university-based initiatives follows.

- Southern Connecticut State University has cooperated with Science Parks Development Corporation in New Haven to establish a Patent Library at Science Park. It is the first such library to be located in a university-affiliated high-tech park and affiliated with a univerisity school of library information science in the nation.

- Connecticut College has established a summer institute to advance minority interest in higher education. The Institute for Minority Advancement offers four programs for 200 minority high school students and their teachers.

- Connecticut College has established Academic Alliances between the college and area high schools to promote foreign language learning at all levels. Fellowships for high school teachers are offered through this program.

- Yale's financial, academic and professional support of Science Park in New Haven is a model for partnerships among higher education, government and business designed to diversify local economies through applied research and development and technology transfer.

- The University of Connecticut's financial, academic and professional support of Conntech Park in Storrs also is a model for higher education, government and business partnership.

- In 1987, Yale established a $50 million investment and loan fund for economic development projects in New Haven. Yale also invested $2 million in the newly formed Connecticut Seed Ventures Fund.

- Yale has beem a magnet for medical-related companies locating in the Greater New Haven area. Officials of Bristol-Myers said the proximity of Yale researchers was a key factor in their decision to locate a major drug research center in nearby Wallingford. Three Yale faculty members are invovled in a joint venture, Molecular Diagnostics Inc., with the West German pharmaceutical giant Bayer AG, parent of Miles Laboratories in West Haven.

- AGABUR, the state's Association for German-American Business and University Relations was created to support the University of Connecticut course on German firms and also coordinate a subsequent six-month study-abroad program at the University of Mannheim. Internships are available to students at export-oriented firms in Germany. Student placement is coordinated by AGABUR firms and Connecticut's Trade Office in Frankfurt.

The University of Connecticut, the home of the state's Biotechnology Center of Excellence created a for-profit research and development corporation in 1984 to evaluate and transfer research and technologies that have significant commercial potential. Of the several R&D corporation success stories, most are in the area of biotechnology.

- The Central Connecticut Venture Group was established as a chapter in January 1985 by UCONN R&D corporation President Hohnke and a Hartford attorney. This Hartford-based club is yet another example of how technology officers can become active in improving the climate for commercialization of faculty inventions.
- Established in 1973, the International Business Center at Quinnipiac College, places students in Connecticut companies to complete comprehensive export marketing and finance studies for the companies. In addition, the Center manages collective internships to Japan, whereby each student represents a Connecticut company and markets its products.

- The University of Connecticut and Quinnipiac College operate export assistance centers, where college seniors and graduate business students complete export feasibility studies and develop overseas marketing plans and export strategies for Connecticut firms.

- Yale University's International Studies Outreach Program conducts a series of programs focusing on the business and political culture of 12 foreign nations. The program is aimed at members of the higher education community, high school faculties and the international business people.

Coordinating Efforts

As noted previously, NEBHE's 1987 case study revealed campus efforts toward internationalization were not coordinated with those of business, government and the economic development community. This update has found that in 1988 and 1989, much more is happening to foster this coordination.

University faculty and administrators have traditionally shared their work within academia. On the relatively rare occasions when findings have been shared beyond the academic community, they have generally been shared only at the national level. But it is state policymakers who could benefit significantly from much of the research.

Because this reaching out to an expanded community is very new to many academic researchers and administrators, the state and business leaders must take care to foster this type of relationship. With continued efforts to coordinate various activities, Connecticut campuses, businesses, government offices and economic development groups are laying a solid foundation to ensure the state's global economic competitiveness.

V. Recommendations

The following recommendations aim to enhance the Connecticut higher education community's reponse to the challenge of global economic competitiveness. These recommendations do not relate strictly to higher education initiatives, but all require the diversity of talent that exists in the academic community in partnership with business and government leaders.

Education and Training

To leaders of higher education, government and business:

- Use university resources, coordinated by the state Department of Economic Development or the Department of Labor, to initiate a study of industrial demand for scientists and engineers on a statewide basis.
- Create campus-based global education centers to:
  - Help local teachers at all levels upgrade basic education;
  - Develop model instructional materials;
  - Coordinate a university-based speaker's bureau to encourage early interest in science and engineering careers.
- Through the Department of Labor's newly created Connecticut Employment and Training Commission, evaluate Rhode Island's Workforce 2000 Council and its funding mechanism as a model for worker training initiatives.

International Awareness

To leaders of higher education, government and business:

- Establish a mechanism for Connecticut businesses and the state to fund study-abroad programs in non-Western regions.

- Use global education centers to:
  - Assist local teachers at all levels in introducing an international focus to curricula;
  - Expand opportunities for a wide variety of foreign-language study in elementary, middle and high schools, as well as international affairs courses in high schools.

To leaders of Higher Education:

- Provide opportunities for high school students to participate in foreign-language and international affairs programs at campus-based summer institutes. Also, use the summer institutes to provide teachers at all levels with new internationally focused curricular resources.

- Encourage Connecticut firms doing business abroad to assist in expanding internship possibilities for students.

- Focus on the global economy in liberal arts and in general education to familiarize undergraduate students with the larger international concerns that will have an impact upon their lives and careers.

- Expand dual-degree programs, particularly for business and engineering students, so they can gain knowledge of a specific world region, learn a foreign language, and have opportunities for overseas internships related to their fields of study.

- Reinstate language requirements for admission to four-year institutions.

- Attempt to build a presence on campus of foreign students from all world regions, and encourage their involvement in programs designed to enhance international awareness among native students and local residents.

- Initiate continuing education and executive development programs in international business, international affairs and foreign languages, with particular emphasis on international management courses or programs for engineers and other high technology personnel.

To the New England Board of Higher Education:

- Undertake a regionwide review to determine which of New England's trading partners or potential trading partners are inadequately served by campus-based "area studies" centers, and encourage creation of new centers to fill the gaps.

- Encourage new and existing area studies centers to:
  - Establish semester exchange programs in international affairs, foreign language, liberal arts and business;
  - Share relevant studies on trade, regulatory, monetary and economic development policy studies with government agencies and legislators as requested throughout New England;
  - Provide seminars and literature for New England business people who want to begin exporting or expand current export operations;
  - Develop relationships with foreign institutions to provide a framework for faculty and student exchange, as well as joint research and curriculum development opportunities.

R&D Investment and Technology Transfer

To leaders of higher education, government and business:

- Establish a statewide technology transfer council with representatives of business and appropriate university-based research centers to monitor:
  - Current and future needs for research parks;
  - The adequacy of seed money and venture capital;
  - The need for incubators for new companies;
  - Scientific and technological strengths that could be nurtured for economic diversification.

- Establish a mechanism for businesses and the state to provide funding for expanded seminar programs, allowing exchange between university R&D staff and state industrial R&D staff.

To leaders of higher education:

- Create interdisciplinary institutes between schools of business and engineering to develop an integrated approach to competitiveness (Rhode Island College's Center for Industrial Technology serves as a model for such an initiative).

- Through graduate schools of business, coordinate efforts with economic development agencies and trade organizations to make more technical assistance available to local busniesses. (Boston's Export Strategy Team serves as a model for such an initiative--See Appendix for details).

- State university campuses should use their advanced research, public policy and area studies centers to increase involvement in state-specific policy studies and technical assistance for Connecticut's long-term economic and international trade development.

- The six Land Grant Colleges of New England should devise a coordinated computer database for the region to generate needed demographic and economic data relevant for timely state planning (The California Almanac provides a good model for such an undertaking).

- Connecticut research universities should consider establishing research, productivity and technology transfer centers.

- The state Department of Higher Education should create an annual directory of faculty research expertise to include activities of the public and private institutions of higher education in the state. The directory should be disseminated to high technology companies and international businesspeople throughout the state.

To the New England Board of Higher Education:

- Assist research universities, technology-based companies and New England state governments in evaluating ways for faculty, post-doctoral students, and industrial engineers and scientists to pursue research sabbaticals in other nations.

APPENDIX

Who are the business schools involved in BEST?

The business schools involved are:

- Babson College
- Bentley College
- Boston College
- Bunker Hill Community College
- Northeastern University
- Suffolk University
- University of Massachusetts/Boston

Who are the organizations participating in BEST?

Public and private organizations involved in the program include the:

- City of Boston's Economic Development and Industrial Corporation (EDIC)
- International Coordinating Council (ICC)
- International Business Center
- Massport's Foreign Trade Unit
- Massachusetts Industrial Financing Authority (MIFA)
- State's Office of International Trade and Investment (OITI)
- Small Business Administration (SBA)
- Small Business Association of New England (SBANE)
- World Trade Institute

What does it cost to participate in BEST?

A $200 fee is charged to participate in BEST. It covers the incidental costs students will incur during the semester in preparing the feasibility study (phone calls, transportation, printing, etc.) and the administrative costs of running the overall BEST program.

For further information about BEST, please give one of us a call.

Andrew Bendheim, Massport, 439-5560
Paul Horn, EDIC/Boston, 725-3342
Charlie van Nederpelt, Boston College, 352-3167

August, 1988

Boston's Export Strategy Team

B.E.S.T.

A Program to Assist Small Businesses in the Exploration of International Marketing Opportunities

A cooperative effort of Boston-area Business Schools and International Trade Organizations

WHAT YOU SHOULD KNOW ABOUT THE

B.E.S.T.

Boston's Export Strategy Team

What is BEST?

BEST is a cooperative effort by leading Boston-area graduate business schools to help local companies identify and develop strategies to capture foreign markets for their products or services. By combining university research talent with the expertise and resources of local economic development and trade organizations, BEST offers companies a unique opportunity to understand and pursue their export potential.

Who should participate in BEST?

BEST is specifically designed for Boston-area companies serious about making the most of their export potential.

How will BEST work for you?

Participation in BEST provides your company with three basic services:

1. A Practical Guide for Implementing Your Export Program. A professional market analysis and feasability study, prepared by a graduate student consulting team closely supervised by a business school faculty member in international marketing will provide your company with an export strategy. This will include recommendations on:

- o alternative export markets
- o marketing objectives
- o marketing strategies
- o product adjustments
- o promotion mix
- o distribution channels
- o pricing strategies

2.) Speakers on Export Topics. Trade experts will offer practical perspectives on important export topics: on the "nuts and bolts" of exporting as well as current trends. Specific topics will be chosen to reflect your company's particular export concerns. The discussions will center on developing strategic responses to assist you in strengthening your position in international trade.

3.) Ongoing Assistance. Through its public and private sector sponsors, BEST will assist you further in obtaining information and services necessary to implement your export program. Organizations such as the World Trade Institute, Massport's Foreign Trade Unit, the State's Office of International Trade and Investment, and the Small Business Administration will help BEST clients take advantage of their respective trade libraries and data bases. The City of Boston's Economic Development and Industrial Corporation (EDIC), and the Massachusetts Industrial Finance Authority (MIFA) will provide financing assistance to exporters.

APPENDIX

THE U.S. - CANADA FREE TRADE AGREEMENT

"A Study of the Costs and Benefits to New England"

A New England Council Report

March 1988

11. TRADE PROFILE FOR CONNECTICUT

Connecticut ranks second in New England for total trade with Canada, behind Massachusetts. In 1986, Connecticut imported $850 million in goods from Canada and exported $830 million. With only a $20-million deficit on almost $1.7 billion worth of traded goods, Connecticut has the most balanced trade relationship in the region. In finished goods trade with Canada, Connecticut enjoys a significant surplus, as shown in Figure 3.

Connecticut Exports

Table 3 illustrates the strength of Connecticut's trade in finished goods. Connecticut's leading exports to Canada were aircraft, plus engines and parts ($141 million in 1986). These products are traded duty-free. Electronics, one of the state's top employers is another important export category. Although the dollar value of telecommunications trade is roughly even, with exports valued at $21 million and imports amounting to $22 million, the tariff schedule protecting this equipment is not. The Canadian tariff on U.S. telecommunications equipment ranges from 10.2 to 17.8 percent while the U.S. tariff on Canadian equipment ranges from 4.7 to 8.5 percent. Computer exports to Canada reached $34 million in 1986. The FTA would eliminate the 3.9 percent tariff on computers immediately. With the elimination of the higher Canadian tariffs, the Connecticut telecommunications and computers industries could become more cost competitive, with a resulting shift in the trade balance in Connecticut's favor.

Other major finished goods shipped to Canada include measuring and laboratory equipment, special industry machinery, photographic supplies, watches, clocks, jewelry and silverware, medical supplies, office equipment and printed materials (see Table 3). Although machine tools and metalworking machinery are not among the largest product groups Connecticut ships to Canada, the machine tool industry is important because it is linked to the health of other industry sectors in Connecticut. It has experienced difficulty over the last two years, but is gaining momentum, especially in domestic orders. The

Figure 3

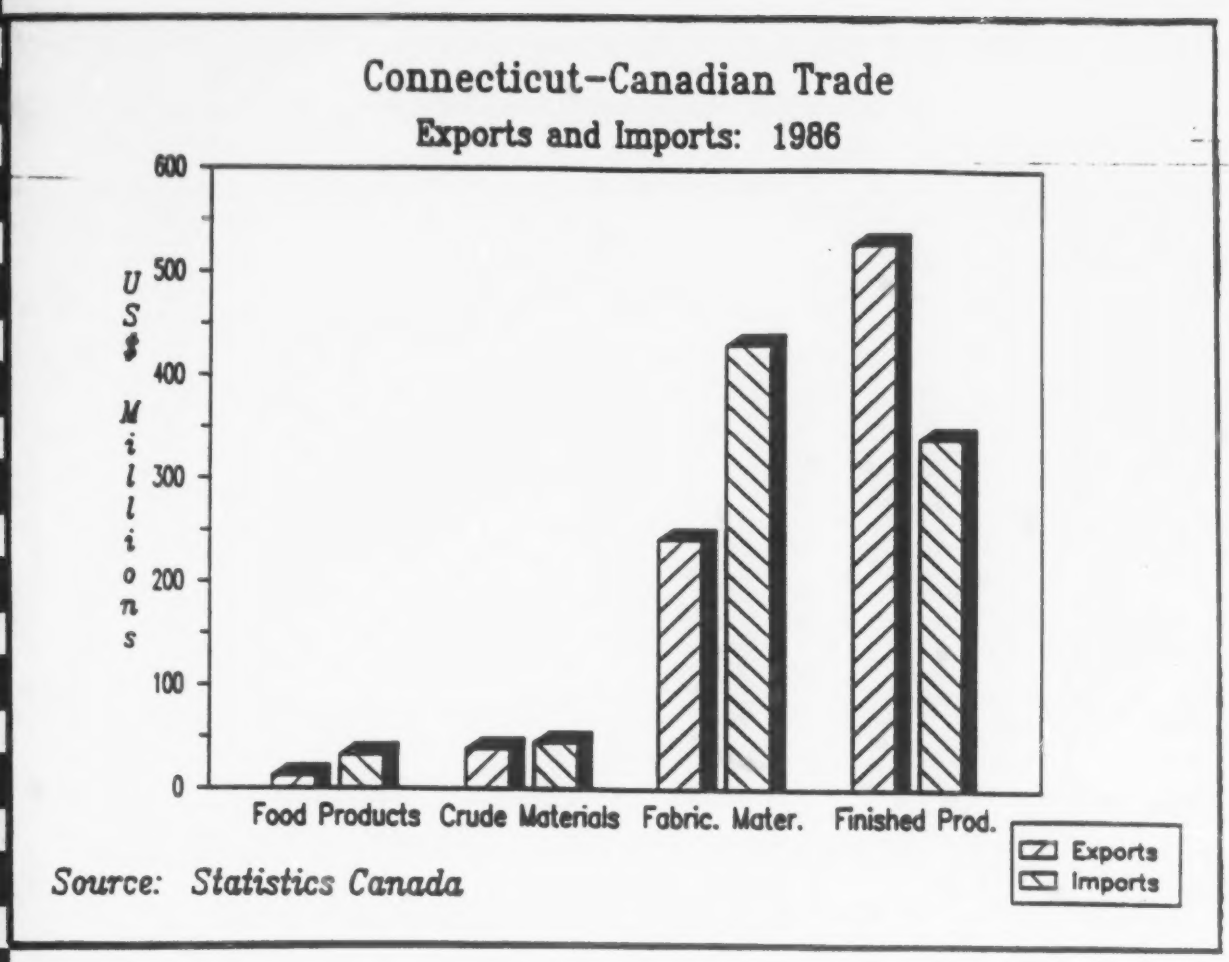

Connecticut–Canadian Trade
Exports and Imports: 1986
US$ Millions
600
500
400
300
200
100
0
Food Products
Crude Materials
Fabric. Mater.
Finished Prod.
Exports
Imports
Source: Statistics Canada

Table 3
Leading Connecticut Exports to Canada
By Major Commodity Category: 1986

Commodity	U.S. $1000s	Percent of total category
Food, Feed, Beverages, Tobacco		
Live Animals	4,811	40
Fish and Fish Products	1,392	11
Tobacco	1,369	11
Coffee	1,323	11
Food and Food Materials	1,102	9
Tea	601	5
Cereals and Cereal Products	380	3
Sugar and Sugar Preparations	376	3
Cocoa and Chocolate	130	1
Vegetable and Vegetable Products	112	1
Total for ten leading exports	11,596	95
Total for commodity category	12,160	
Crude Materials		
Crude Petroleum	19,703	51
Metal Ore, Concentrate and Scrap	12,268	32
Abrasives and other Crude Non-metallic Mineral Products	1,647	4
Textile Fibers	728	2
Crude Wood Materials	396	1
Rubber, Gums and other Crude Vegetable Products	344	1
Fur Skins and other Crude Animal Products	270	1
Total for seven leading exports	35,356	92
Total for commodity category	38,357	
Fabricated Materials		
Precious Metals	78,243	32
Plastic Materials	27,031	11
Organic and Inorganic Chemicals	25,570	11
Aluminum, Copper, Nickel and other Non-ferrous Alloys	20,113	8
Nuts, Bolts, Screws and other Basic Hardware	19,016	8
Dyes, Pigments, Paints and other Chemicals	17,060	7
Valves, Pipefittings and other Metal Products	10,041	4
Wood Pulp	9,454	4
Iron and Steel Bars, Plates, Pipe and Wire	7,999	3
Textile Fabricated Material	7,422	3
Paper and Paperboard	6,607	3
Abrasives and other Mineral Products	2,162	1
Petroleum and Coal Products	2,087	1
Lumber	1,794	1
Rubber Fabricated Materials	1,082	0
Total for 15 leading exports	235,679	97
Total for commodity category	242,622	

(Table 3 continued)

Commodity	U.S. $1000s	Percent of total category
Finished Products		
Aircraft, Engines and Parts	141,283	27
Bearings, Engines, Pumps and other General Industrial Machinery	37,434	7
Computers	34,495	7
Measuring and Lab Equipment	34,146	6
Special Industry Machinery (Including Printing, Textiles and Plastics)	33,977	6
Hand Tools and Equipment	29,143	6
Motor Vehicle Parts and Engines	25,911	5
Printed Material	25,454	5
Telecommunication Parts and Equipment	20,798	4
Electrical Lighting and Equipment	17,341	3
Office Machines	14,788	3
Metalworking Machinery	13,111	2
Medical Supplies	11,681	2
Film and Other Photographic Goods	10,741	2
Watches, Clocks, Jewelry and Silverware	10,665	2
Containers and Closures	8,166	2
Airconditioning and Refrigeration Equipment	4,331	1
Stationer's and Office Supplies	3,194	1
Railway Rolling Stock	2,454	0
Ships, Boats and Engines	1,392	0
Total for 20 leading exports	480,506	91
Total for commodity category	528,602	

SOURCE: Staff calculations from Statistics Canada, "Domestic Exports/Imports to/from the U.S.A, January to December, 1986."

proposed elimination of Canada's 9.3 percent tariff over the next five years could help the industry to full recovery.

Fabricated and crude materials play a somewhat smaller role in the export trade picture. Precious metals led the category with shipments of $78 million in 1986. They face tariffs of 0 to 20 percent, depending on the product form. These tariffs would be eliminated over the next five years if the FTA is ratified. Other leading fabricated and crude material exports include plastics, chemicals and chemical products, non-precious metals, valves, pipe fittings and other metal fabricated products, wood pulp, paper and textiles.

Connecticut Imports

Printed material, mainly from Quebec and Ontario, is the leading Canadian import to the state. Shipments of books, magazines and other printed goods were valued at $124 million in 1986. Printed goods are traded duty-free between the two countries. Aircraft, plus engines and parts accounted for another $86 million in imports in 1986, although the state boasted a strong surplus in these products, with shipments of $141 million to Canada during that year. The duty-free status for aircraft and related products would not change under the Agreement. Other leading finished goods imports from Canada include auto parts, tools and equipment, ships and boats, electrical lighting equipment, general purpose industrial machinery, containers, motor vehicles, and office machines (see Table 4).

In addition to finished goods, Connecticut imports significant amounts of fabricated and crude goods from Canada. The leading import in this category is newsprint, with shipments valued at over $108 million in 1986. Copper and alloys are another large import item, with over $91 million in shipments. As shown in Table 1, U.S. tariffs on copper products range between 1 and 6.3 percent, compared to Canadian tariffs of 4 to 10.3 percent. These tariffs would be eliminated over ten years.

Connecticut imports of Canadian lumber, almost exclusively composed of softwood, amounted to $58 million in shipments in 1986. Other leading fabricated and crude materials imported from Canada include iron, steel, mineral products, precious metals, wood pulp, plastics and rubber. Imports of food or agricultural products consist mainly of whiskey and other beverages, meat, and fish products.

Table 4
Leading Connecticut Imports from Canada
By Major Commodity Category: 1986

Commodity	U.S. $1000s	Percent of total category
Food, Feed, Beverages, Tobacco		
Whiskey and Other Beverages	10,174	31
Meat	7,026	21
Fish and Fish Products	4,802	15
Sugar and Sugar Preparations	3,273	10
Cereals and Cereal Products	3,099	9
Vegetables and Vegetable Products	1,827	6
Feeds and Fodder	1,203	4
Total for seven leading exports	31,404	96
Total for commodity category	32,750	
Crude Materials		
Crude Pertroleum	26,934	60
Non-precious Metal Ore and Scrap	7,052	16
Precious Metals	5,694	13
Seeds, Kernels and other Crude Vegetable Products	3,043	7
Pulpwood Chips and other Crude Wood Products	1,030	2
Asbestos and other Crude Non-metallic Minerals	795	2
Total for six leading exports	44,549	99
Total for commodity category	45,047	
Fabricated Materials		
Newsprint and other Paper	108,073	25
Copper and Alloys	91,286	21
Lumber	57,519	13
Iron, Steel, Castings, Bars and Plate	27,877	6
Abrasives and other Mineral Products	22,164	5
Basic Metal Fabricated Products	18,959	4
Precious Metals and Alloys	16,226	4
Shingles, Plywood and other Wood Fabricated Products	15,730	4
Wood Pulp	15,299	4
Rubber and Plastic Materials	13,170	3
Pertroleum and Coal Products	12,729	3
Aluminum, Zinc, Lead and other Non-ferrous Metals and Alloys	9,237	2
Organic and Inorganic Chemicals and Elements	8,506	2
Nickel and Alloys	4,842	1
Yarn, Thread and other Textile Products	3,060	1
Fertilizer and Fertilizer Material	2,995	1
Chemical Products	2,248	1
Total for 17 leading exports	429,919	100
Total for commodity category	431,985	

(Table 4 continued)

Commodity	U.S. $1000s	Percent of total category
Finished Products		
Printed Material	123,595	36
Aircraft, Engines and Parts	85,676	25
Telecommunication Equipment	21,660	6
Hand Tools and Equipment	17,218	5
Motor Vehicle Parts	12,418	4
Ships, Boats and Parts	9,897	3
Electrical Lighting and Equipment	8,434	2
Engines and other General Purpose Industrial Machinery	7,594	2
Containers and Closures	6,630	2
Motor Vehicles	6,314	2
Office Machines	5,598	2
Measuring Equipment	3,843	1
Prefabricated Buildings and Structures	3,599	1
Metalworking Machinery	3,037	1
Materials Handling Equipment	2,449	1
Heating and Refrigeration Equipment	2,155	1
Apparel and Footwear	1,726	1
Toys and Games	1,723	1
Plastics Industry Machinery	1,641	0
Total for 19 leading exports	325,207	96
Total for commodity category	340,104	

SOURCE: Staff calculations from Statistics Canada, "Domestic Exports/Imports to/from the U.S.A, January to December, 1986."

Summary

The FTA, with the immediate relaxation and eventual elimination of tariffs, may bring new opportunities for market expansion in the telecommunications equipment industry. A related industry which would also benefit is the computer industry. Both of these well-established industries may see increased employment and greater income. The industrial machinery industry could also see expanded markets with the removal of Canadian tariffs over five years. The machinery industry, already strong in Connecticut, could be a real winner from the FTA.

Service industries, like insurance in Connecticut, also stand to gain from the FTA. Canada would give national treatment to such U.S. industries, allowing them the opportunity to compete at the same level as Canadian firms.

Over the longer run, the textile industry could begin to reap the benefits of more liberalized trade with Canada. However, if Canada continues with its proposed duty-remissions scheme, the U.S. textile industry will face a further impediment to competition. Other industries would also benefit from the FTA through the stabilization of their supplies of raw materials, including paper, lumber, petroleum, iron, steel, and copper.

END

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